

74 Rec'd PCT/PTO 09 JUL 1998

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

VO-391

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)

09/101498

INTERNATIONAL APPLICATION NO.

PCT/EP96/05789

INTERNATIONAL FILING DATE

20 December 1996

PRIORITY DATE CLAIMED

17 January 1996

TITLE OF INVENTION

AIR-CONDITIONED SWITCHING CABINET

APPLICANT(S) FOR DO/EO/US


Norbert MÜLLER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND OR SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)). (verified)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). (executed, attached to a copy of the International Application)
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11. to 16. below concern other document(s) or information included:
 11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
 12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
 13. ☒ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
 14. ☒ A substitute specification. (attached to a marked-up version of the English language translation)
 15. ☐ A change of power of attorney and/or address letter.
 16. ☒ Other items or information:
 - Form PCT/IB/301
 - Form PCT/IB/304
 - Form PCT/IB/308
 - Form PCT/ISA/210 (English language version, 3 pages)
 - Transmittal of Substitute Specification
 - Certificate of Mailing by Express Mail
 - Form PTO-1449 (2 Sheets) and a copy of each and every reference cited therein
 - Return Receipt Postcard

EXPRESS MAIL NO.: EM353371240US

MAILED: 09 July 1998

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO. PCT/EP96/05789		ATTORNEY'S DOCKET NUMBER VO-391		
17. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO \$ 930.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) \$ 720.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$ 790.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$ 1,070.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$ 98.00				CALCULATIONS		PTO USE ONLY
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$ 930.00		
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).						
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE			
Total claims	4* - 20 =		X \$22.00			
Independent claims	1* - 03 =		X \$82.00			
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00			
TOTAL OF ABOVE CALCULATIONS =				\$ 930.00		
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).						
SUBTOTAL =				\$ 930.00		
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				+		
TOTAL NATIONAL FEE =				\$ 930.00		
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				+		
TOTAL FEES ENCLOSED =				\$ 970.00		
* Based upon entry of the First Preliminary Amendment.				Amount to be: refunded	\$	
				charged	\$	
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>970.00</u> to cover the above fee is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>19-3550</u> . A duplicate copy of this sheet is enclosed.						
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.						
SEND ALL CORRESPONDENCE TO: Speckman Pauley Petersen & Fejer 2800 West Higgins Road, Suite 365 Hoffman Estates, Illinois 60195 (847) 490-1400 Fax: (847) 490-1403				 SIGNATURE Douglas H. Pauley NAME 33,295 REGISTRATION NUMBER		

09/101498

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Norbert MÜLLER
Title: AIR-CONDITIONED SWITCHING CABINET
Based Upon: PCT/EP96/05789
Express Mail No.: EM353371240US
Date of Deposit: 09 July 1998

FIRST PRELIMINARY AMENDMENT

Box PCT
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Please amend the subject application as follows to place this application
in better condition for examination:

In the New Claims 1-4 as contained in the two sheets identified in the
lower right corner with the words AMENDED PAGE:

Delete the heading "New Claims" and insert the following heading:

--I Claim:--

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Based Upon: PCT/EP96/05789

1. (Amended) [An] In an air-conditioned switchgear cabinet [with] having a plurality of wall elements and at least one cabinet door, [as well as] and an air-conditioner [,wherein the air-conditioner is] integrated in the cabinet door, the improvement comprising:

[characterized in that]

the cabinet door (30) [is] designed as a tub-shaped housing for receiving [the] a plurality of air-conditioner components (23, 24, 25) [of the air-conditioner] and [delimits] delimiting a receptacle space [which adjoins the] adjoining an interior of [the] a rack (10) [or the cabinet body and] in which the air-conditioner components (23, 24, 25) [of the air-conditioner] are connected and wired with each other [ready for operation].

2. (Amended) [An] In an air-conditioned switchgear cabinet in accordance with claim 1, wherein

[characterized in that]

the air-conditioner components (23, 24, 25) [of the air-conditioner and/or the heat exchanger] are covered toward the interior [of the cabinet body] of the rack (10) by a cover.

Based Upon: PCT/EP96/05789

3. (Amended) [An] In an air-conditioned switchgear cabinet in accordance with claim [1 or] 2, wherein

[characterized in that]

the cover [is provided with] has a plurality of air-aspirating and air-outlet openings [when an air-conditioner has been integrated].

4. (Amended) [An] In an air-conditioned switchgear cabinet in accordance with [one of claims 1 to] claim 3, wherein

[characterized in that]

the cover [is provided with] has a plurality of air-inlet openings and one of the wall element (20) [or] and the cabinet door (30) [with] has a plurality of air outlet openings [when a] and an integrated heat exchanger [has been integrated].

Please add the following **ABSTRACT OF THE DISCLOSURE** on a separate page:

Based Upon: PCT/EP96/05789

--ABSTRACT OF THE DISCLOSURE

An air-conditioned switching cabinet with wall elements and at least one cabinet door and an air-conditioning unit and/or heat exchanger. Use of the air-conditioning is simplified and broadened according to the invention by incorporation of the air-conditioning unit and/or heat exchanger in a wall element or the cabinet door, the wall element or cabinet door being designed as a housing for the components of the air-conditioning unit and/or heat exchanger.---

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Based Upon: PCT/EP96/05789

REMARKS

Applicant respectfully requests entry of the above Preliminary Amendment to place this patent application in better form for prosecution in the U.S. Patent and Trademark Office.

Claims 1-4 of the two sheets bearing the words AMENDED PAGE, in the lower right corner, have been amended to eliminate multiple dependent claims and to more definitely and fully claim the subject matter of Applicant's invention. Applicant urges that the above Preliminary Amendment introduces no new matter into this patent application.

Applicant sincerely believes that this patent application is now in condition for prosecution in the U.S. Patent and Trademark Office and, thus, entry of the above Preliminary Amendment is respectfully requested.

Respectfully submitted,



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WO97/26691

PCT/CH96/05789

Air-Conditioned Switching Cabinet

The invention relates to an air-conditioned switchgear cabinet with wall elements and at least one cabinet door, as well as an air-conditioner and/or heat exchanger.

In known air-conditioned switchgear cabinets, the air-conditioner is a component separate from the switchgear cabinet, which must be placed on the switchgear cabinet and brought into air-conducting connection with the interior of the switchgear cabinet. In this case the cover of the switchgear cabinet must be provided with openings, which are matched to the air-aspirating and air-outlet openings of the air-conditioner, such as represented, for example, in DE 37 10 566 and DE 37 35 551 C1. Such a design of a switchgear cabinet is particularly suited for retrofitting the switchgear cabinet with an air-conditioner, but requires an increased outlay for parts for the air-conditioner designed as a separate unit.

Switchgear cabinets, or respectively walls of switchgear cabinets are also known, wherein an air-conditioner (or components thereof) has been installed in the interior of the cabinet body or rack of the switchgear cabinet, as shown in DE 88 07 768 U1. However, equipping an air-conditioned switchgear cabinet in this way has the disadvantage that space for assemblies in the interior is lost and that air-conditioning a fully equipped switchgear cabinet at a later time is no longer possible.

As shown in DE 37 38 941 C1 and DE 40 13 372 A1, it has also already been provided to install an air-conditioner in an open side of a rack. This has the advantage that the interior can be practically completely available for assemblies and that in

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certain installation situations of the cooling device a later installation on a completely equipped switchgear cabinet is also possible. However, defined additional fastening elements must be provided for this.

It is the object of the invention to provide an air-conditioned switchgear cabinet of the type mentioned at the outset which is considerably simpler in design and can be delivered, without hampering the installation of assemblies in the interior, with or without an air-conditioner and/or heat exchanger, but always permits the its later installation.

In accordance with the invention, this object is attained in that the air-conditioner and/or heat exchanger is integrated in a wall element or the cabinet door, wherein the wall element or the cabinet door are embodied as a housing for receiving the components of the air-conditioner and/or the heat exchanger.

With this design, the switchgear cabinet and the air-conditioner and/or the heat exchanger constitute one delivered unit as a rule, which leaves the interior completely free for installations by the user. But the wall element or the cabinet door with the air-conditioner and/or the heat exchanger constitute a further structural unit which can be cost-effectively produced and which can be retrofitted at any time as the replacement for a wall element or the cabinet door of a non-air-conditioned switchgear cabinet. It is possible in this way to provide a fully equipped switchgear cabinet with air-conditioning by means of an air-conditioner and/or heat exchanger at a later time.

If in accordance with one embodiment it has been provided that the wall element or the cabinet door border a receptacle space which adjoins the interior of the rack or the cabinet body,

the interior is outwardly expanded in the simplest way and the wall element of the cabinet door retains the original function as a closure of the switchgear cabinet, but constitutes the housing for receiving the components of the air-conditioner and/or the heat exchanger.

A further embodiment provides that the components of the air-conditioner and/or the heat exchanger are connected and wired with each other ready for operation. It is then merely required to connect the air-conditioner and/or the heat exchanger with the electric power supply for the switchgear cabinet.

Air circulation in the switchgear cabinet can be directly affected in that the components of the air-conditioner and/or the heat exchanger are covered toward the interior of the cabinet body of the rack by means of a cover and that, with the integration of an air-conditioner, the cover is provided with air-aspirating and air-outlet openings, or that, with the integration of a heat exchanger, the cover is provided with air-inlet openings and the wall element or the cabinet door with air-outlet openings.

The invention will be explained in more detail by means of exemplary embodiments schematically represented in the drawings. Shown are in:

Fig. 1, a schematic representation of an opened switchgear cabinet with a rack, wherein an air-conditioner is integrated in a wall element, and

Fig. 2, a schematic representation of an opened switchgear cabinet with a cabinet body, wherein an air-conditioner is integrated in the cabinet door.

Fig. 1 shows a switchgear cabinet with a rack 10, which is closed on three sides by means of a bottom sheet metal plate 17, a cover sheet metal plate 18 and a wall element 19.

The left side of the rack 10, which is delimited by vertical frame legs 11 and 12 and horizontal frame legs 16, is closed with a wall element 20, in which an air-conditioner with the components 23, 24 and 25 is integrated. The front of the rack 10, delimited by the frame legs 11, 13, 14 and 15 is closed by means of a cabinet door 30. The cabinet door 30 is hinged to the vertical frame leg 13 by means of hinges 32 and can be fixed in the closed position by means of a lock 31. The cabinet door can be reinforced on the inside by means of a door frame 33 placed on it.

The wall element 20, which is trapezoidal in cross section, with inclined wall elements 21 and 22, forms a tub-like housing, in which the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger have been installed, so that an integrated component is created which can be connected with the rack 10 like a normal wall element 19.

The components 23, 24 and 25 can be covered in the wall element 20 by means of a cover, which is provided with air-aspirating and air-outlet openings. In this case the appropriately designed components of the air-conditioner can follow directly behind it. When integrating a heat exchanger, the cover can be provided with inlet openings and the wall element 20 with air-outlet openings. The arrangement of the air-inlet openings and air-outlet openings and the distribution of the components 23, 24 and 25 decide the circulation of air in the heat exchanger and is provided in a known manner.

In place of the rack 10 and the wall elements, it is also possible to use a cabinet body 10', which is only open at its front, as shown in Fig. 2. Then the cabinet door 30 is designed as the housing for the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger. The cabinet door 30 with the integrated air-conditioner and/or heat exchanger is then hinged on the cabinet body like a normal cabinet door. As a rule, the air-conditioned switchgear cabinet with the air-conditioner and/or heat exchanger integrated in the cabinet door 30 is made available as a delivered unit and can be purchased with components which are connected and wired ready for operation. The cabinet door with the integrated air-conditioner and/or heat exchanger can also be ordered later as a component and can be used later for air-conditioning a completely built and equipped switchgear cabinet. In this case only the cabinet door needs to be exchanged.

New claims

1. An air-conditioned switchgear cabinet with wall elements and at least one cabinet door, as well as an air-conditioner, wherein the air-conditioner is integrated in the cabinet door

characterized in that

the cabinet door (30) is designed as a tub-shaped housing for receiving the components (23, 24, 25) of the air-conditioner and delimits a receptacle space which adjoins the interior of the rack (10) or the cabinet body and in which the components (23, 24, 25) of the air-conditioner are connected and wired with each other ready for operation.

2. An air-conditioned switchgear cabinet in accordance with claim 1,

characterized in that

the components (23, 24, 25) of the air-conditioner and/or the heat exchanger are covered toward the interior of the cabinet body of the rack by a cover.

3. An air-conditioned switchgear cabinet in accordance with claim 1 or 2,

characterized in that

the cover is provided with air-aspirating and air-outlet openings when an air-conditioner has been integrated.

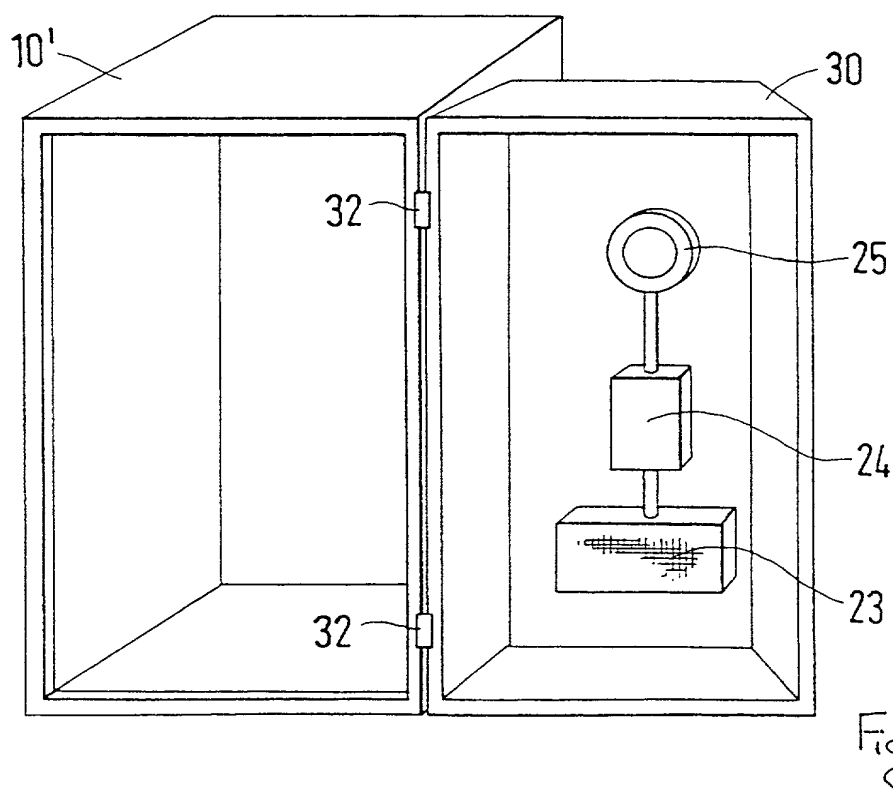
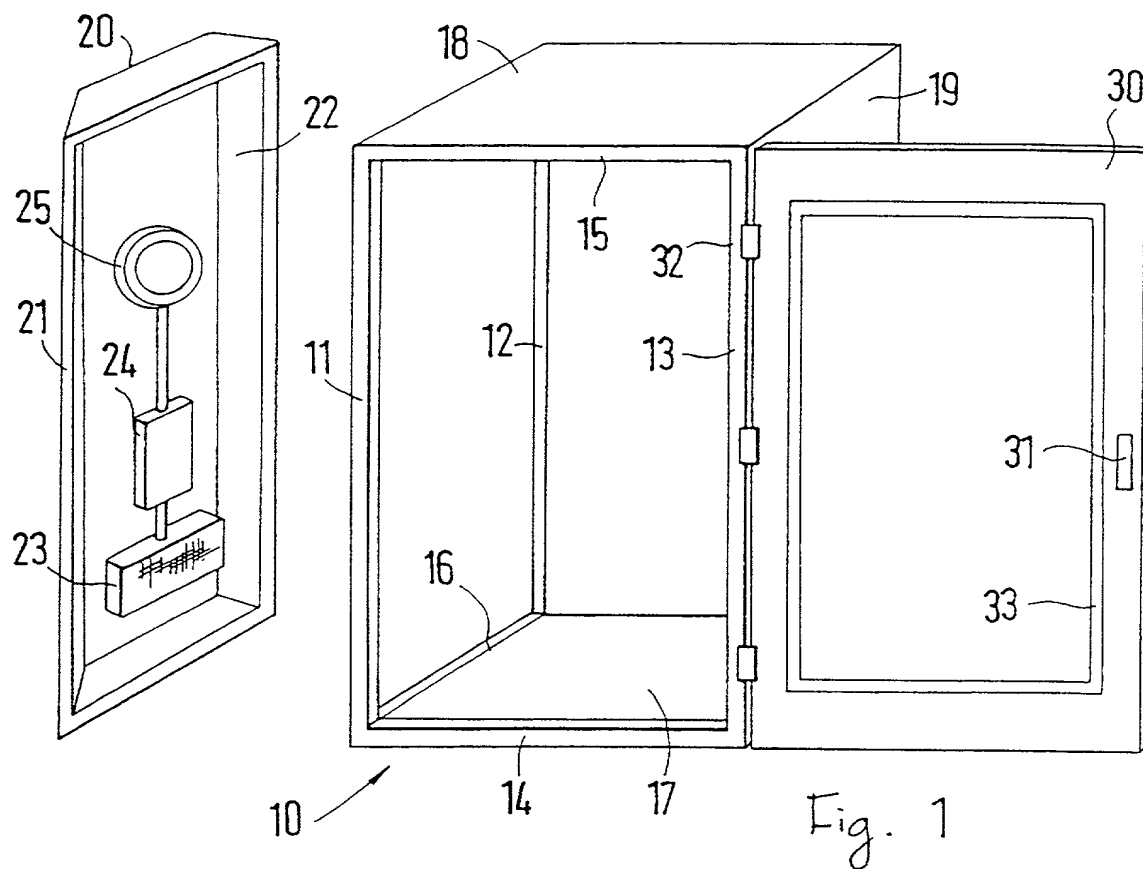
4. An air-conditioned switchgear cabinet in accordance with one of claims 1 to 3,

characterized in that

the cover is provided with air-inlet openings and the wall element (20) or the cabinet door (30) with air outlet openings when a heat exchanger has been integrated.

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Patent and Trademark Office-U.S. DEPARTMENT OF COMMERCE

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

<u>196 01 456.5</u> (Number) (Nummer)	<u>Germany</u> (Country) (Land)	<u>17 January 1996</u> (Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	<input checked="" type="checkbox"/> Yes Ja	<input type="checkbox"/> No Nein
<u>PCT/EP96/05789</u> (Number) (Nummer)	<u>PCT</u> (Country) (Land)	<u>20 December 1996</u> (Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	<input checked="" type="checkbox"/> Yes Ja	<input type="checkbox"/> No Nein
<u> </u> (Number) (Nummer)	<u> </u> (Country) (Land)	<u> </u> (Day/Month/Year Filed) (Tag/Monat/Jahr eingereicht)	<input type="checkbox"/> Yes Ja	<input type="checkbox"/> No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 112 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT Internationale Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>None</u>	<u>None</u>	<u>None</u>
<u>(Application Serial No.)</u> (Anmeldeseriennummer)	<u>(Filing Date)</u> (Anmeldedatum)	<u>(Status)</u> (patentiert, anhangig aufgegeben)
<u>None</u>	<u>None</u>	<u>(Status)</u> (patented, pending, abandoned)
<u>(Application Serial No.)</u> (Anmeldeseriennummer)	<u>(Filing Date)</u> (Anmeldedatum)	<u>(Status)</u> (patentiert, anhangig aufgegeben)
		<u>(Status)</u> (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer antühren)

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BEVOLLMÄCHTIGUNG DER ANWÄLTE, AUFTRÄGE UND INSTRUKTIONEN VOM VERTRETER DES ANMELDERS ENTGEGENZUNEHMEN UND AUSZUFÜHREN

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Voller Name des einzigen oder ursprünglichen Erfinders:

Norbert MÜLLER

Unterschrift des Erfinders

Datum

Wohnsitz

Dietzhölztl, Germany

Staatsangehörigkeit

Germany

Postanschrift

Auf der Weide 2

D-35716 Dietzhölztl, Germany

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following Attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Thomas W. Speckman Regis. No. 22,617 Douglas H. Pauley Regis. No. 33,295

Maxwell J. Petersen Regis. No. 32,772 Charles C. Kinne Regis. No. 31,631

Mark E. Fejer Regis. No. 34,817 Kevin D. Erickson Regis. No. 38,736

Nick C. Kottis Regis. No. 31,974

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AUTHORIZATION OF ATTORNEYS TO ACCEPT AND FOLLOW INSTRUCTIONS FROM REPRESENTATIVE

The undersigned to this declaration and power of attorney hereby authorizes the U.S. attorneys named above to accept and follow instructions from

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as to any actions to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorneys will be so notified by the undersigned.

Full name of sole or first inventor

Norbert MÜLLER

Inventor's signature

Date

Residence

Dietzhölztl, Germany

Citizenship

Germany

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D-35716 Dietzhölztl, Germany

Based Upon: PCT/EP96/05789

SUBSTITUTE SPECIFICATION

PTO/PCT Rec'd 9 JUL 1993

Based Upon: PCT/EP96/05789

AIR-CONDITIONED SWITCHING CABINET

360403640360

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an air-conditioned switchgear cabinet with wall elements and at least one cabinet door, as well as an air-conditioner and/or heat exchanger.

Description of Prior Art

In known air-conditioned switchgear cabinets, the air-conditioner is a component separate from the switchgear cabinet, which must be placed on the switchgear cabinet and brought into air-conducting connection with the interior of the switchgear cabinet. In this case the cover of the switchgear cabinet must have openings, which are matched to the air-aspirating and air-outlet openings of the air-conditioner, such as represented, for example, in German Patent References DE 37 10 566 and DE 37 35 551 C1. Such a design of a switchgear cabinet is particularly suited for retrofitting the switchgear cabinet with an air-conditioner, but requires increased costs for parts for the air-conditioner designed as a separate unit.

Switchgear cabinets, or respectively walls of switchgear cabinets are also known, wherein an air-conditioner, or components thereof, is installed in the interior of the cabinet body or rack of the switchgear cabinet, as shown in German Patent Reference DE 88 07 768 U1. However, equipping an air-conditioned switchgear cabinet in this way has one disadvantage that space for assemblies in the

interior is lost and that air-conditioning a fully equipped switchgear cabinet at a later time is no longer possible.

As shown in German Patent References DE 37 38 941 C1 and DE 40 13 372 A1, it is known to install an air-conditioner in an open side of a rack. This has the advantage that the interior can be practically completely available for assemblies and that in certain installation situations of the cooling device a later installation on a completely equipped switchgear cabinet is also possible. However, defined additional fastening elements must be provided for this.

SUMMARY OF THE INVENTION

It is one object of this invention to provide an air-conditioned switchgear cabinet of the type mentioned above which is considerably simpler in design and can be delivered, without hampering the installation of assemblies in the interior, with or without an air-conditioner and/or heat exchanger, but also permits a later installation.

In accordance with this invention, this object is attained with an air-conditioner and/or a heat exchanger that is integrated in a wall element or the cabinet door, wherein the wall element or the cabinet door are embodied as a housing for receiving the components of the air-conditioner and/or the heat exchanger.

With this design, the switchgear cabinet and the air-conditioner and/or the heat exchanger are normally one unit, which leaves the interior completely free for installations by the user. But the wall element or the cabinet door with the air-

conditioner and/or the heat exchanger constitute a further structural unit which can be cost-effectively produced and which can be retrofitted at any time as the replacement for a wall element or the cabinet door of a non-air-conditioned switchgear cabinet. It is thus possible to provide a fully equipped switchgear cabinet with a capability to add an air-conditioner and/or heat exchanger at a later time.

If in one embodiment the wall element or the cabinet door border a receptacle space which adjoins the interior of the rack or the cabinet body, the interior is outwardly expanded in the simplest way and the wall element of the cabinet door retains the original function as a closure of the switchgear cabinet, but constitutes the housing for receiving the components of the air-conditioner and/or the heat exchanger.

In a further embodiment the components of the air-conditioner and/or the heat exchanger are connected and wired with each other, ready for operation. It is then merely required to connect the air-conditioner and/or the heat exchanger with the electric power supply for the switchgear cabinet.

Air circulation in the switchgear cabinet can be directly affected in that the components of the air-conditioner and/or the heat exchanger are covered toward the interior of the cabinet body of the rack by means of a cover and that, with the integration of an air-conditioner, the cover has air-aspirating and air-outlet openings, or that, with the integration of a heat exchanger, the cover has air-inlet openings and the wall element or the cabinet door with air-outlet openings.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention will be explained in more detail by means of exemplary embodiments schematically represented in the drawings wherein:

Fig. 1 is a schematic perspective representation of an opened switchgear cabinet with a rack, wherein an air-conditioner is integrated in a wall element; and

Fig. 2 is a schematic perspective representation of an opened switchgear cabinet with a cabinet body, wherein an air-conditioner is integrated in the cabinet door.

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 shows a switchgear cabinet with a rack 10, which is closed on three sides by means of a bottom sheet metal plate 17, a cover sheet metal plate 18 and a wall element 19.

The left side of the rack 10, which is delimited by vertical frame legs 11 and 12 and horizontal frame legs 16, is closed with a wall element 20, in which an air-conditioner with the components 23, 24 and 25 is integrated. The front of the rack 10, delimited by the frame legs 11, 13, 14 and 15 is closed by means of a cabinet door 30. The cabinet door 30 is hinged to the vertical frame leg 13 by means of hinges 32 and can be fixed in the closed position by means of a lock 31. The cabinet door 30 can be reinforced on the inside by means of a door frame 33 placed on the cabinet door 30.

The wall element 20, which is trapezoidal in cross section, with inclined wall elements 21 and 22, forms a tub-like housing, in which the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger are installed, so that an integrated component is created which can be connected with the rack 10 like a normal wall element 19.

The components 23, 24 and 25 can be covered in the wall element 20 by means of a cover, which has air-aspirating and air-outlet openings. In this case the appropriately designed components of the air-conditioner can follow directly behind the air-conditioner. When integrating a heat exchanger, the cover can have inlet openings and the wall element 20 can have air-outlet openings. The arrangement of the air-inlet openings and air-outlet openings and the distribution of the components 23, 24 and 25 dictate the circulation of air in the heat exchanger, in a known manner.

In place of the rack 10 and the wall elements, it is also possible to use a cabinet body 10', which is only open at a front, as shown in Fig. 2. Then the cabinet door 30 is designed as the housing for the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger. The cabinet door 30 with the integrated air-conditioner and/or heat exchanger is hinged on the cabinet body like a normal cabinet door. As a rule, the air-conditioned switchgear cabinet with the air-conditioner and/or heat exchanger integrated in the cabinet door 30 is available as a delivered unit and can be purchased with components which are connected and wired ready for operation. The cabinet door 30 with the integrated air-conditioner and/or heat

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exchanger can also be ordered later as a component and can be used later for air-conditioning a completely built and equipped switchgear cabinet. In this case only the cabinet door 30 needs to be exchanged.

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BACKGROUND OF THE INVENTION
Field of the Invention

Air-Conditioned Switching Cabinet

Description of Prior Art

[The] ^{This} invention relates to an air-conditioned switchgear cabinet with wall elements and at least one cabinet door, as well as an air-conditioner and/or heat exchanger.

In known air-conditioned switchgear cabinets, the air-conditioner is a component separate from the switchgear cabinet, which must be placed on the switchgear cabinet and brought into air-conducting connection with the interior of the switchgear cabinet. In this case the cover of the switchgear cabinet must be provided with ^{have} openings, which are matched to the air-aspirating and air-outlet openings of the air-conditioner, such as represented, for example, in ^{German Patent References} DE 37 10 566 and DE 37 35 551 C1. Such a design of a switchgear cabinet is particularly suited for retrofitting the switchgear cabinet with an air-conditioner, but requires ^(an) increased ^[outlay] for parts for the air-conditioner designed as a separate unit. ^{costs}

Switchgear cabinets, or respectively walls of switchgear cabinets are also known, wherein an air-conditioner ^{or components thereof} ^{is} ^{has been} installed in the interior of the cabinet body or rack of the switchgear cabinet, as shown in ^{German Patent Reference} DE 88 07 768 U1. However, equipping an air-conditioned switchgear cabinet in this way has ^{the} ^{one} disadvantage that space for assemblies in the interior is lost and that air-conditioning a fully equipped switchgear cabinet at a later time is no longer possible.

As shown in ^{German Patent References} DE 37 38 941 C1 and DE 40 13 372 A1, it ^{is known} ^{has} also already been provided ^{to} install an air-conditioner in an open side of a rack. This has the advantage that the interior can be practically completely available for assemblies and that in

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[SUMMARY OF THE INVENTION]

certain installation situations of the cooling device a later installation on a completely equipped switchgear cabinet is also possible. However, defined additional fastening elements must be provided for this.

It is ^{one} [the] object of ^{this} [the] invention to provide an air-conditioned switchgear cabinet of the type mentioned [at the outset] ^{above} which is considerably simpler in design and can be delivered, without hampering the installation of assemblies in the interior, with or without an air-conditioner and/or heat exchanger, but ^{also} [always] permits [the its] ^a later installation.

In accordance with ^{this} [the] invention, this object is attained ^{with an} [in that the] air-conditioner and/or ^a heat exchanger ^{that} is integrated in a wall element or the cabinet door, wherein the wall element or the cabinet door are embodied as a housing for receiving the components of the air-conditioner and/or the heat exchanger.

With this design, the switchgear cabinet and the air-conditioner and/or the heat exchanger [constitute] ^{are normally} one [delivered] unit [as a rule], which leaves the interior completely free for installations by the user. But the wall element or the cabinet door with the air-conditioner and/or the heat exchanger constitute a further structural unit which can be cost-effectively produced and which can be retrofitted at any time as the replacement for a wall element or the cabinet door of a non-air-conditioned switchgear cabinet. It is ^{thus} possible [in this way] to provide a fully equipped switchgear cabinet with [air-conditioning by means of] an air-conditioner and/or heat exchanger at a later time. ^{a capability to add}

If in [accordance with] one embodiment [it has been provided that] the wall element or the cabinet door border a receptacle space which adjoins the interior of the rack or the cabinet body,

the interior is outwardly expanded in the simplest way and the wall element of the cabinet door retains the original function as a closure of the switchgear cabinet, but constitutes the housing for receiving the components of the air-conditioner and/or the heat exchanger.

In a [A] further embodiment [provides that] the components of the air-conditioner and/or the heat exchanger are connected and wired with each other, ready for operation. It is then merely required to connect the air-conditioner and/or the heat exchanger with the electric power supply for the switchgear cabinet. *directly*

Air circulation in the switchgear cabinet can be [directed] affected in that the components of the air-conditioner and/or the heat exchanger are covered toward the interior of the cabinet body of the rack by means of a cover and that, with the integration of an air-conditioner, the cover [is provided with] *has* air-aspirating and air-outlet openings, or that, with the integration of a heat exchanger, the cover [is provided with] *has* air-inlet openings and the wall element or the cabinet door with air-outlet openings.

This [The] invention will be explained in more detail by means of exemplary embodiments schematically represented in the drawings. Shown are in:

Fig. 1 *is* a schematic *wherein* representation of an opened switchgear cabinet with a rack, wherein an air-conditioner is integrated in a wall element, *and is*

Fig. 2 *is* a schematic *perspective* representation of an opened switchgear cabinet with a cabinet body, wherein an air-conditioner is integrated in the cabinet door.

BRIEF DESCRIPTION OF THE DRAWINGS

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 shows a switchgear cabinet with a rack 10, which is closed on three sides by means of a bottom sheet metal plate 17, a cover sheet metal plate 18 and a wall element 19.

The left side of the rack 10, which is delimited by vertical frame legs 11 and 12 and horizontal frame legs 16, is closed with a wall element 20, in which an air-conditioner with the components 23, 24 and 25 is integrated. The front of the rack 10, delimited by the frame legs 11, 13, 14 and 15 is closed by means of a cabinet door 30. The cabinet door 30 is hinged to the vertical frame leg 13 by means of hinges 32 and can be fixed in the closed position by means of a lock 31. The cabinet door³⁰ can be reinforced on the inside by means of a door frame 33 placed on [it]. the cabinet door 30

The wall element 20, which is trapezoidal in cross section, with inclined wall elements 21 and 22, forms a tub-like housing, in which the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger [have been] ^{are} installed, so that an integrated component is created which can be connected with the rack 10 like a normal wall element 19.

The components 23, 24 and 25 can be covered in the wall element 20 by means of a cover, which [is provided with] ^{has} air-aspirating and air-outlet openings. In this case the appropriately designed components of the air-conditioner can follow directly behind [it]. ^{the air conditioner} When integrating a heat exchanger, the cover can ^{have} [be provided with] inlet openings and the wall element 20 can have [with] air-outlet openings. The arrangement of the air-inlet openings and air-outlet openings and the distribution of the components 23, 24 and 25 [decide] ^{dictate} the circulation of air in the heat exchanger [and is provided] in a known manner.

In place of the rack 10 and the wall elements, it is also possible to use a cabinet body 10', which is only open at [its] a front, as shown in Fig. 2. Then the cabinet door 30 is designed as the housing for the components 23, 24 and 25 of the air-conditioner and/or the heat exchanger. The cabinet door 30 with the integrated air-conditioner and/or heat exchanger is [then] hinged on the cabinet body like a normal cabinet door. As a rule, the air-conditioned switchgear cabinet with the air-conditioner and/or heat exchanger integrated in the cabinet door 30 is [made] available as a delivered unit and can be purchased with components which are connected and wired ready for operation. The cabinet door³⁰ with the integrated air-conditioner and/or heat exchanger can also be ordered later as a component and can be used later for air-conditioning a completely built and equipped switchgear cabinet. In this case only the cabinet door³⁰ needs to be exchanged.